Optimization of extreme ultraviolet emission and the time of flight spectra with dual -pulse laser irradiating tin -droplet target

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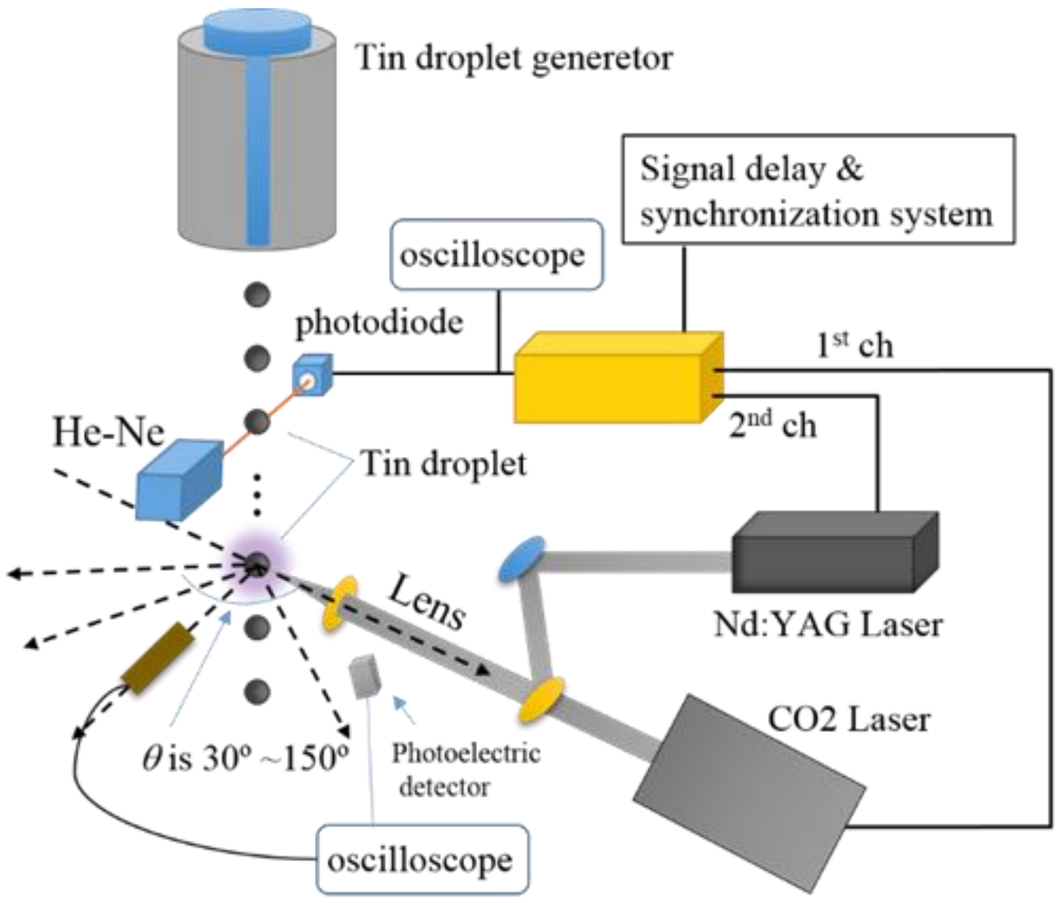
Introduction

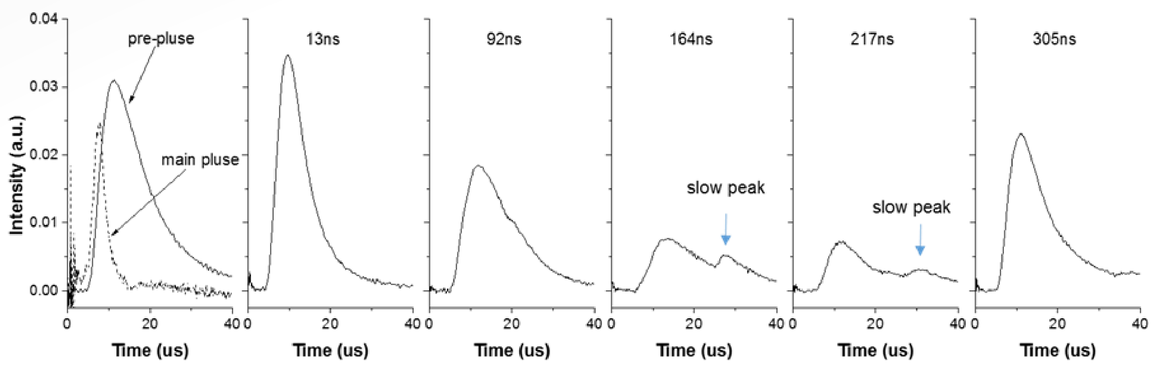
The EUV emission and time of flight (TOF) spectra in dual-pulse laser produced plasma (LPP) have been investigated based on tin-droplet target. A series of EUV IRDs and Faraday Cups are employed to detect the EUV emission and ion signals under the condition of coaxial dual-pulse laser that the pre-pulse was Nd:YAG laser and the main pulse was CO2 laser. The effects of prepulsed laser intensity and delay timings between the prepulsed and the pumping pulse were investigated to find the optimal pre-plasma conditions before the pumping pulse. The initial optimization of these parameters resulted in 15% increase in EUV conversion efficiency (CE) from the tin LPP. The ion kinetic energies were calculated and comparatively analyzed. The results illustrate that the ion average kinetic energy of dual-pulse LPP were smaller than that of main pulse LPP with independent of the delay time. Furthermore, the ions TOFs in dual-pulse LPP have been fitted by a superimposed Maxwell–Boltzmann distribution and thus obtained the variation plasma temperature and mass-center velocity with delay time in dual-pulse LPP.

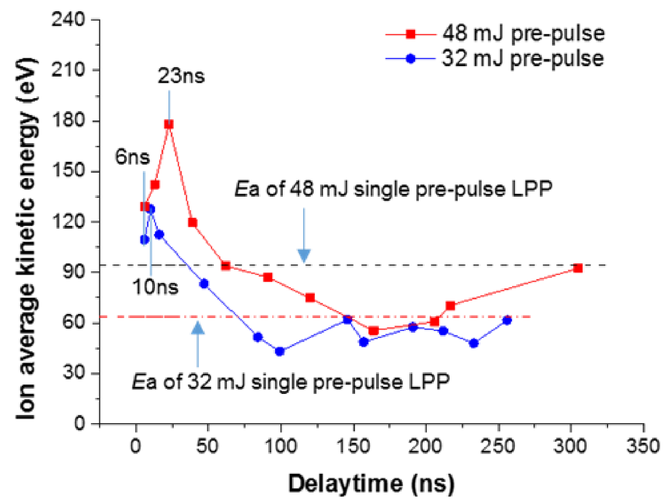
Experimental



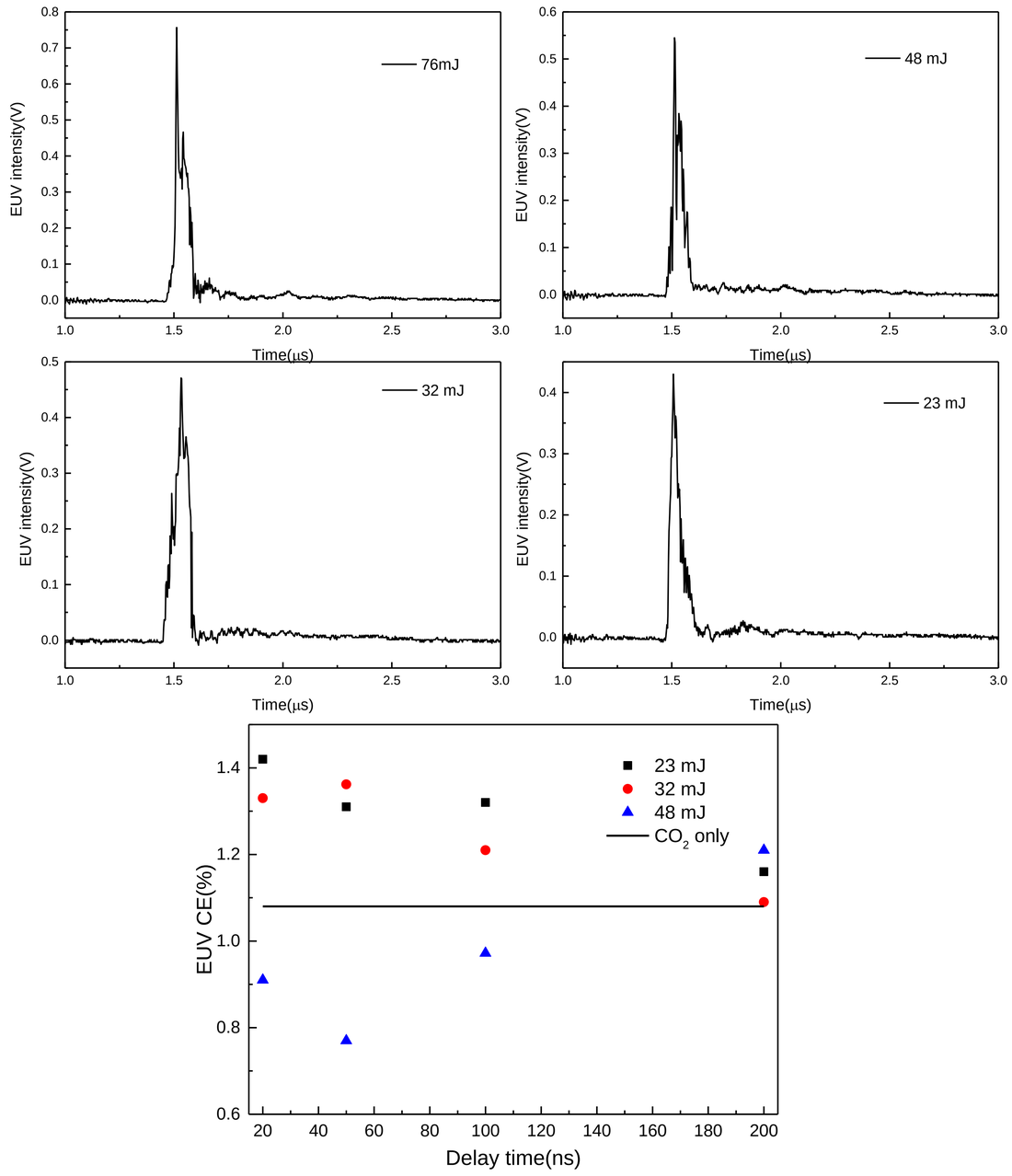
Results and Conclusions

Ion analysis





EUV emission



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